

A Review Paper on 5G Wireless Technology

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Abstract- The objective of this paper is to study about 5G wireless technology. Existing research in mobile communication is related to 5G technology. In 5G technology, the mobile user has given utmost priority compared to others. 5G Technology stands for 5th Generation Mobile Technology. 5G technology is, to make use of mobile phones within very high bandwidth. The consumer never experienced the utmost valued technology as 5G. The 5G technologies include all types of advanced features which make 5G technology most dominant technology in near future.

Keywords- IoT5G, 5G Architecture, Evolution of 5G, WLAN, features, future scope, hardware and software of 5G.

I. INTRODUCTION

5G ("5th Generation") is the latest generation of cellular mobile communications. It succeeds the 4G (LTE), 3G (UMTS) and 2G(GSM) systems. Its performance targets high data rate, reduced latency, energy saving, cost reduction, higher system capacity, and massive device connectivity[6].

II. THE EVOLUTION OF GENERATIONS FROM 0 TO 4TH GENERATION

0G WIRELESS SYSTEM: During the end of the 1940's, the first radio telephone service was introduced, and was designed to users in cars to the public land-line based telephone network. In the 1960's, a system launched by Bell Systems, called, Improved Mobile Telephone Service (IMTS), brought quite a few improvements such as direct dialling and more bandwidth. The very first analog systems were based upon IMTS and were created in the late 60s and early 70s[6].

1G WIRELESS SYSTEM: networks use analog signals. For voice modulation a Higher frequency of ≈ 150 MHz was used. Speed of 1st generation of analog cell phones is up to 2.4 kbps, allows users to make voice calls in 1 country.

1G standard:

*NMT (Nordic Mobile Telephone)

* AMPS (Advanced Mobile Phone System)[6].

2GWIRELESS SYSTEM commercially launched on the GSM standard in Finland (1991). It provides facility of SMS (Short Message Service) and use the bandwidth of 30 to 200

KHz. 2G networks allows for much greater penetration intensity. E.g. GPRS, CDMA [6].

3G WIRELESS SYSTEM makes use of TDMA and CDMA. In 2005, 3G came into the use in computer networking (WCDMA, WLAN and Bluetooth) and mobile devices area (cell phone and GPS). The spectral efficiency of 3G technology is better than 2G technologies. Transmission speeds from 125 kbps to 2 Mbps. Data are sent through technology called packet switching. High clarity in Voice calls. Access to Global Roaming[6].

4G WIRELESS SYSTEM should be able to provided very smooth global roaming with 4G Mobile Phone. 4G offers both cellular and multimedia services everywhere. Now with 4G the mobile TV provider redirects or provides the facility of TV channel directly to the subscriber's phone where it can be watched. Video on demand on the subscriber's phone. Video conferencing facility so that subscribers now can see and talk with each other. A medical advice can be provided with telecommunication. Mobile ultra-broadband (gigabit speed) access and multi-carrier transmission[6].

III. COMPARISON OF 1G TO 5G TECHNOLOGIES

Technologies from 1G to 5G can be easily understand and differentiate with the help of this comparison table shown in fig.

COMPARISON BETWEEN 1G, 2G, 3G, 4G AND 5G					
Technology / Features	1G	2/2.5G	3G	4G	5G
Start/ Deployment	1970/ 1984	1980/ 1999	1990/ 2002	2000/ 2010	2010/ 2015
Data Bandwidth	2 kbps	14.4-64 kbps	2 Mbps	200 Mbps to 1 Gbps for low mobility	1 Gbps and higher
Standards	AMPS	2G: TDMA, CDMA, GSM 2.5G: GPRS, EDGE, 1xRTT	WCDMA, CDMA-2000	Single unified standard	Single unified standard
Technology	Analog cellular technology	Digital cellular technology	Broad bandwidth CDMA, IP technology	Unified IP and seamless combination of broadband, LAN/WAN/	Unified IP and seamless combination of broadband,

IV. WHAT IS 5G TECHNOLOGY?

Fifth generation of wireless mobile network which will begin in 2015s. It has almost no limitation which makes it

isolated or completed wireless communication. Mobile users not had experience of such a highly advance technology [16]An end user can also connect their 5G mobile phones with their desktops to have internet connection. It totally supported World Wide Wireless Web (WWWW).

V. STANDARD WIRELESS 5G

WiMAX gives interoperability and conformance of the IEEE 802.16 standard and it aims to provide wireless data over long-distance from point-to-point link to cellular mobile type access. IEEE 802.16e in process to provide collaborative and generic mobile WiMAX and WiBRO is also part of 802.16e for this purpose. 3GPPLTE a project aims to improve the mobile phone standard to cope with future requirements. Project on 5GPP 2 UMB is going on to improve the quality ofCDMA2000[6].

VI. WHAT IS 5G AND WHAT IT OFFERS

5G stands for 5th generation of Mobile Technology (Wireless Technology) 5Goffers wearable devices having artificial intelligence capabilities with it, and one unified global standard. Ubiquitous computing: user can simultaneously connect several wireless access technologies. 5Gtechnology is providing range of Gigabit. 5G technology can support almost 65,000connections. In 5G technology with a remote management system a user can get better and fast solution. The 5G technology also support virtual private network.5G Wireless uses OFDM and a frequency band of 2–8 GHz[6].

VII. KEYTERMS OF 5G TECHNOLOGY:

1. 5G is a completed wireless communication with almost no limitation; somehow people called it REAL wireless world
2. Additional features such as Multimedia Newspapers, also to watch T.V programs with the clarity as to that of an HD T.V.
3. We can send Data much faster than that of the previous generations.
4. 5G will bring almost perfect real world wireless or called “WWWW: World Wide Wireless Web[7]
5. Real wireless world with no more limitation to access and zone issues.
6. Wearable devices with AI capabilities.
7. Internet protocol version 6 (IPv6), where a visiting care-of mobile IP address is assigned according to location and the connected network.
8. One unified global standard[2].

VIII. FEATURES

1. 5G technology offers high resolution for crazy cell phone user and bi- directional large bandwidth shaping.
2. The advanced billing interfaces of 5G technology make it more attractive and effective.
3. 5G technology also providing subscriber supervision tools for fast action.
4. The high quality services of 5G technology based on Policy to avoid error.
5. 5G technology is providing large broadcasting of data in Gigabit which supporting almost 65,000 connections.[19]
6. 5G technology offers a transporter class gateway with unparalleled consistency.
7. The traffic statistics by 5G technology makes it more accurate.
8. Through remote management offered by 5G
9. Technology a user can get a better and faster solution.
10. The remote diagnostics also a great feature of 5G technology.
11. The 5G technology is providing up to 25 Mbps connectivity speed[7,11].

8.1HARDWARE OF 5G

- 1) UWB Networks: higher bandwidth at low energy levels. This short-range radio technology is ideal for wireless personal area networks (WPANs). UWB complements existing longer range radio technologies –such as Wi-Fi, WiMAX, and cellular wide area communications – that bring in data and communications from the outside world. UWB provides the needed cost-effective, power-efficient, high bandwidth solution for relaying data from host devices to devices in the immediate area (up to 10 meters or 30 feet).
- 2) Bandwidth: 4000 megabits per second, which is 400 times faster than today’s wireless networks.
- 3) Smart antennas.

Switched Beam Antennas: Switched Beam Antennas support radio positioning via Angle of Arrival (AOA) information collected from nearby devices.

Adaptive Array Antennas: The use of adaptive antenna arrays is one area that shows promise for improving capacity of wireless systems and providing improved safety through position location capabilities. These arrays can be used for interference rejection through spatial _altering, position location through direction ending measurements, and developing improved channel models through angle of arrival channel sounding measurements.

4) Multiplexing: CDMA (Code Division Multiple Access) CDMA employs analog-to-digital conversion (ADC) in combination with spread spectrum technology. Audio input is first digitized into binary elements. The frequency of the transmitted signal is then made to vary according to a defined pattern (code), so it can be intercepted only by a receiver whose frequency response is programmed with the same code, so it follows exactly along with the transmitter frequency. There are trillions of possible frequency-sequencing codes, which enhance privacy and makes cloning difficult [20].

8.2 SOFTWARE OF 5G:

- 1) 5G will be single unified standard of different wireless networks, including LAN technologies, LAN/WAN, WWW- World Wide Wireless Web, unified IP & seamless combination of broadband.
- 2) Software defined radio (SDR), Packet layer, Implementation of Packets, Encryption, Flexibility, Anti-Virus[20].

IX. FUTURE SCOPE

5th generation technology is designed to provide incredible and remarkable data capabilities, unhindered call volumes, and immeasurable data broadcast within the latest mobile operating system. Hence, it is more intelligent technology, which will interconnect the entire world without limits. Likewise, our world would have universal and uninterrupted access to information, communication, and entertainment that will open a new dimension to our lives and will change our life style meaningfully[2].

Moreover, governments and regulators can use this technology as an opportunity for the good governance and can create healthier environments, which will definitely encourage continuing investment in 5G, the next generation technology[2].

10.1 ADVANTAGES:

High resolution and bi-directional large bandwidth shaping

Technology to gather all networks on one platform

More effective and efficient

Technology to facilitate subscriber supervision tools for the quick action.

It will provide a huge broadcasting data, which will support more than 60,000 connections.

Easily manageable with the previous generations.

Technological sound to support heterogeneous services

Possible to provide uniform, uninterrupted, and consistent connectivity across the world[9].

10.2 DISADVANTAGES:

Technology is still under process and research on its viability is going on.

The speed ,this technology is claiming seems difficult to achieve (in future ,it might be)because of the incompetent technological support in most parts of the world.

Many of the old devices would not be competent to 5g, hence,all of them need to be replaced with the new one-expensive deal.

Developing infrastructure needs high cost.

Security and privacy issue ye to b solved[9].



X. APPLICATION OF 5G

Some of the significant applications are –

It will make unified global standard for all.

Network availability will be everywhere and will facilitate people to use their computer and such kind of mobile devices anywhere anytime.

Because of the IPv6 technology, visiting care of mobile IP address will be assigned as per the connected network and geographical position.

Its application will make world real Wi Fi zone.

Its cognitive radio technology will facilitate different version of radio technologies to share the same spectrum efficiently.

Its application will facilitate people to avail radio signal at higher altitude as well[7].

XI. CONCLUSION

Hope this page provides a better brief knowledge on 5G WIRELESS TECHNOLOGY. In this paper we review introduction to 5G technology, applications, evolution of generations from 0 to 5g technology, advantages,

disadvantages, features, hardware and software of 5g.5G is one of the intelligent technologies as it offers tremendous data capabilities and unlimited calls. This generation is expected to be released around 2020.

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